

How can intuition about data structure be harnessed to support data analysis?

#2201177: Supporting Reasoning with Multidimensional Datasets: Leveraging Student Intuitions

Background

Students often expressed confusion about compact hierarchical data tables in CODAP. They had trouble linking data on the right with information on the left.

Names (12 cases)			Hands (45 cases)		cases (220 cases)	
Name	Age	Video games	Hand	Sound cue	Trial no.	Distance (inches)
1 Andrew	42	Yes	1 Dominant	Silent	1	7
2 Anna	36	Yes	2 Non-Dominant	Silent	2	8.1
3 Carla	38	No	3 Dominant	With sound	3	6.5
4 Chris	45	Yes	4 Non-Dominant	With sound	4	9
5 Elizabeth	73	No	1 Dominant	Silent	5	5.5
6 Ian	36	No	2 Non-Dominant	Silent	1	6
7 Ian	73	No	3 Dominant	With sound	2	7
8 Jacob	36	No	4 Non-Dominant	With sound	3	6.5
9 Kristen	38	Yes	1 Dominant	Silent	4	5.5
10 Molly	37	No	2 Non-Dominant	Silent	5	5
11 Susan T.	42	No	3 Dominant	With sound	1	7
12 Wayne	54	No	4 Non-Dominant	With sound	2	5.5

Intriguing Results

1. By the 2nd session, almost all students shifted back to the compact view, especially when making data moves.

Conjecture: Students had developed mental imagery of these data structures.

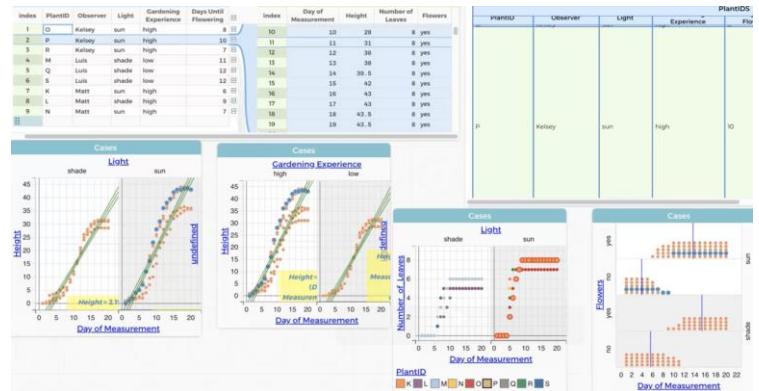
2. Students often used graphs for grouping. (They made lots of them!)

We designed an alternate view.

Most students preferred an expanded view at first because they could “see” the nested tables.

Names			Hands		cases	
Name	Age	Video games	Hand	Sound cue	Trial no.	Distance
Andrew	42	Yes	Dominant	Silent	1	7
					2	8.10
					3	6.50
					4	9
					5	5.50
			Non-Dominant	Silent	1	6
					2	7

But their preferences soon shifted back to the compact view.



Inductive Coding in Process

- What are the students' broader sensemaking phases?

Methods

Small Groups

Think-Alouds

- Collaborative student data production and analysis
- Individual think-aloud interviews with transfer problems
- Deductive video coding of data moves (Hudson et al., 2025)
- Inductive video coding for sensemaking phases

Challenge Area

Video Coding

To complement an in-depth video analysis of two students (almost completed), we plan to selectively code 15 additional transcripts. What approach might be of most interest to the field?

A. Lynn Stephens, Daniel Damelin, Natalya St. Clair, Nathaniel Woodruff

Project web page ICLS paper @Concord article

Hudson, R. A., Mojica, G. F., Lee, H. S., & Casey, S. (2025). Data moves as a focusing lens for learning to teach with CODAP. *Computers in the Schools*, 42(3), 276–301.

Istephens@concord.org

